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C-17 Issues And Concerns

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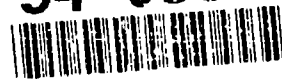
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Mastin, David L. (Industrial College of the Armed Forces) C-17: issues and concerns. Discusses the early years of the C-17 program and highlights how mixing the development and production efforts on the same contract and using an event-based clause contributed to problems the program experienced. The paper discusses the rationale why the program included both development and production work on the same contract; why the contractor changed its accounting methods and transferred previously paid engineering charges from the development effort to the production efforts; and why the government initially approved this action and then subsequently reversed most of the transferred charges. Also discussed is a progress payment made by the government on the production effort of the initial contract even though the government was aware the contractor was significantly overrunning the development portion of the contract. Further, the paper discusses problems both the contractor and the government had meeting the requirements of the event-based clause in the contract. Finally, lessons learned are developed based on the problems discussed. The paper does not support or defend any specific position but attempts to provide background information so the reader can better understand the environment in which the decisions were made.

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INTRODUCTION

This case highlights two areas of the Air Force's C-17 program: event-based contracting and including development and production work on the same contract. I selected the C-17 for two reasons. First, it was one of the original Air Force programs to include an event-based clause, and it included both development and production efforts in its initial contract. Second, the government and contractor made controversial decisions in these areas which the Department of Defense Inspector General (DoD IG) and Congress have sharply criticized.

This case was not written to pass judgment on the C-17 program. As with many programs, the C-17 program has had a number of development and production problems which have caused costs to grow and schedules to slip. Basically, the integration of a number of state-of-the-art features such as electronic flight controls, blown flaps, winglets, and head-up displays proved more difficult than the contractor had estimated.¹ To date, the contractor has lost approximately \$1 billion on the initial contract and there have been four schedule modifications with a fifth one currently being negotiated. This case, however, focuses on events that occurred in the fall of 1990. At that time the program had been in progress for over eight years and only 6 of the planned 210 aircraft (this number has since been reduced to 120) were on contract. The program was in the middle of its Full Scale Engineering Development (FSED) phase and very early in Low Rate Initial Production (LRIP).

The case is divided into four parts. The overview includes a brief history of the program and provides the framework for the decisions that were later made. The second part discusses the event based clause and some of the problems both the government and the contractor encountered because of it. The third part discusses the problems that arose--especially when the contract moved into a loss situation--from having development and production efforts on

the same contract. Finally, the fourth section discusses lessons that can be learned from the experiences of the C-17.

OVERVIEW

The C-17 Globemaster III is the Air Force's next generation airlifter designed to provide the full range of strategic and tactical airlift capability. This blend of capabilities will enable it to carry outsize cargo directly from CONUS bases to austere landing fields throughout the world rather than to main operating bases the current strategic airlifters--C-5s and C-141s--must use today. In many cases this capability eliminates the requirement for a second mode of transportation to the cargo's destination. There is no question that the United States Air Force has valid airlift requirements as the C-141 aircraft near retirement.

PROGRAM INITIATION

The Air Force formally initiated the C-17 program in December 1979 in an effort to supplement its strategic airlift capability.² This action recognized a shift in requirements from tactical airlift to the need for additional strategic airlift capability to support the newly developing Rapid Deployment Force.³

Based on Secretary of Defense (SECDEF) direction, the original Program Management Directive (PMD) for the C-X stressed strategic requirements and also included tactical requirements.⁴ The PMD directed a compressed schedule with Initial Operating Capability (IOC)--the first operational squadron being mission capable--to be not later than the end of FY87. In order to meet this ambitious schedule and to keep costs low, the PMD also directed that the program use "existing technology" and that the program would therefore go directly into the FSED phase of the acquisition cycle, skipping the Demonstration/Validation phase. Some of the critical "existing technology" had just been proven in the Advanced Medium STOL Transport (AMST) program which proved the viability of powered lift through the use of externally blown flaps.⁵ Externally blown flaps is a term used to describe when the engine exhausts directly against the flaps, creating extra lift.

During 1980, the early program strategy evolved and included the use of a Fixed-Price Incentive (FPI) contract for FSED and the first production option and Firm Fixed-Price contracts for the subsequent annual production buys. While this strategy placed more risk on the contractor than a cost type contract, it was considered appropriate, based on using "existing" state-of-the-art technology, including commercial engines and uncomplicated design features on the new aircraft.⁶ To ensure that the interested contractors understood the government's position, the Request for Proposal (RFP) cover letter went so far as to say, "undue complexity or technical risk will be regarded as poor design."⁷ Even so, during proposal preparation, Lockheed questioned the contract type based on its own assessment of the risk.⁸

Three companies--Boeing, McDonnell Douglas, and Lockheed--responded to the RFP. In August 1981--19 months after the original PMD--the Secretary of the Air Force announced that McDonnell Douglas Corporation (MDC), Douglas Aircraft Company (DAC), was the source selection winner. However, the Secretary also announced that the actual contract award would be delayed until after the SECDEF approved a plan satisfying the DoD airlift requirements.⁹

Meanwhile, the need for additional strategic airlift had become a higher priority after the Soviet invasion of Afghanistan and the militant takeover of the American embassy in Iran.¹⁰ These events drove the Office of the Secretary of Defense (OSD) to a more immediate strategic airlift solution. In the fall of 1981, the losers of the C-X competition, Lockheed and Boeing, submitted unsolicited proposals to the Air Force for C-5Ns and B-747s respectively.¹¹ OSD announced in January 1982 that the Air Force would accept Lockheed's unsolicited proposal and buy 50 C-5Ns (later to become C-5Bs) because of the significantly earlier delivery dates as compared with McDonnell Douglas' C-X, now designated the C-17.¹²

Despite the C-5 decision, OSD and the Air Force also decided to go ahead with the C-17 program. However, the Air Force dramatically reduced it to a very modestly paced research and development program. When the Systems Program Office (SPO) finally awarded the development contract, F33657-81-C-

2108 (2108) to DAC in July 1982, it had a value of only \$31.6 million for a low-level 15-month effort.¹³ The contract did, however, contain a clause which allowed the government to restructure it if a decision was made to fully fund the program.

1985 RESTRUCTURE

In early 1985 the decision was made to fully fund the C-17 program and the SECDEF approved FSED go-ahead.¹⁴ The contract restructure was executed in December 1985 and included system engineering (design, development test and analysis), fabrication of one flying test aircraft and two nonflying aircraft for static and durability testing, and the Development Test and Evaluation/Initial Operational Test and Evaluation flight test program.¹⁵ The contract also included priced options for the first two production lots scheduled in FY88 and FY89 which were to remain on the 2108 contract when executed.

Both the development effort and production options were similarly structured. All three efforts had a FPI contract type including the same share ratios, ceiling percentages, and flexible progress payments. Naturally, the development effort had separate contract line items (CLINs) which were incrementally funded (funded on an annual basis) over the life of the effort using Research, Development, Test, and Evaluation (RDT&E) appropriations. Because of the annual funding, the contract included a special provision called Limitation of Government Obligation (LOGO) for FSED. This clause established a funding plan which specified how much, and when the government would add to the development effort each fiscal year. The LOGO clause further stipulated that DAC had to continue performance on the contract as long as the government met the funding plan.¹⁶

The production options for Lot I and Lot II were separate CLINs on the 2108 contract. Since they were production efforts, they were to be fully funded at the time of award using aircraft procurement appropriations. This means that when each production effort was awarded, the government would obligate the full billing price, to the contract. The billing price is normally the target price which is the sum of the negotiated cost and profit

amounts. The restructure also included two other clauses of interest to this case.¹⁷ To make sure that the three distinct efforts were properly segregated for payment purposes, the contract included a special provision, Segregation of Costs. Since all three efforts were FPI, the contract also included a special provision, Information for Incentive Price Revision (Firm Target), which specified that when production lots I and II were exercised, they would be incorporated into a single ceiling with FSED for final price redetermination. This reduced DAC's financial risk on the contract. For example, upon final redetermination if DAC would overrun one or two of the efforts, but not all three, funds would be processed from the underrun effort to the overrun efforts; thus reducing DAC's loss.

Finally, the restructure also included a high risk, success oriented, delivery schedule for the test aircraft, T-1. The schedule called for T-1 delivery in July 1987, only 18 months after executing the modification.¹⁸ However, because of the T-1 delivery schedule, the restructure modification did not include a great deal of concurrency since it called for delivery of the first production aircraft, P-1, 34 months after T-1.

However, the four years between source selection and full development had a number of negative effects on the program.¹⁹ DAC lost many of its experienced workers during the four year period. When the program did restart, other defense programs were in progress competing for skilled aerospace workers. In addition, commercial aircraft orders increased at roughly the same time and also competed for the limited number of skilled workers.

BEYOND THE RESTRUCTURE

In January 1988, after DAC missed the delivery of T-1 and government RDT&E funding was reduced in a DoD budget reduction, the contract delivery schedule was changed.²⁰ The FSED delivery schedule for T-1 was moved three years to the right. Therefore, the concurrency of the program dramatically increased since the gap between delivery of T-1 and P-1 changed from a comfortable 34 months to a very small 2-month gap. This concurrency

complicated the accounting problems between the development and production efforts including how to handle certain engineering charges.

In an effort to challenge DAC to maintain the new schedule and control costs, one of the first event based contracting clauses developed in the Air Force was added to the contract in November 1988.²¹ This special provision linked four separate milestones to the FY89 through FY92 production efforts making the award of each Low Rate Initial Production (LRIP) effort contingent upon successful completion of the milestone it was linked to.²²

However, DAC continued to have problems meeting contract milestones. For instance, because of the delay completing the milestone designated to trigger the FY89 production effort (Lot II), it was not awarded until six months after originally planned. Lot III, the FY90 LRIP effort, was not awarded until 18 months after it was scheduled because of delays in completing its triggering event. These continued development and production problems led to another delivery schedule modification in September 1990.²³ The schedule delays also impacted the program costs.

During the summer of 1990, DoD became aware that McDonnell Douglas Corporation was starting to have overall financial problems--the C-17 being just a part of the problem.²⁴ Other government programs such as the Navy's A-12 and T-45--also fixed price type development efforts--were also having negative financial impact on MDC.²⁵ Specifically, the C-17 program contributed to the problem in two ways. The government exhausted its remaining FY90 RDT&E appropriations for the development effort in the July 1990 progress payment.²⁶ In addition, the Administrative Contracting Officer (ACO) at the Defense Plant Representative Office (DPRO) stopped progress payments on the production efforts in August until DAC provided a fully supported Estimate-at-Completion (EAC)--an essential piece of information in determining progress payments in an FPI contract.²⁷

Based on an August 30, 1990 Defense Acquisition Executive Summary (DAES) review and MDC's uncertain financial situation, OSD and the Air Force jointly instituted a Cost Performance Review Team to review MDC's overall financial

and cash flow status.²⁰ The team worked throughout the fall of 1990 and presented a series of status briefings to senior DoD officials including the Under Secretary of Defense for Acquisition (USD(A)), the Assistant Secretary of the Air Force for Acquisition (SAF/AQ), and senior MDC officials including John McDonnell, the Chief Executive Officer. One idea briefed to help MDC's cash flow was an accounting practice change on the C-17 2108 contract that would shift previously made engineering charges from development to the production efforts.²¹

During the fall three key events occurred which have been highly criticized by the DoD IG and members of Congress. If the 2108 contract did not have both development and production work on the same contract or the contract did not have an event-based clause, these events might not have happened. First, in October 1990, the ACO made a partial progress payment for the production effort--without an alternate EAC. Second, in November the ACO allowed DAC to implement a revised accounting practice on its November progress payment request when he resumed "full" progress payments albeit at a reduced level because of the application of the loss ratio factor after the EAC was finally determined to be over the contract ceiling. Third, in December 1990, the milestone needed to trigger the award of Lot III was accepted. Completion of this milestone, known as "T-1 Assembly Complete," allowed DAC to collect \$16 million dollars, but more importantly, liquidated \$1.65 billion in progress payments.²⁰ This shifted the risk for T-1 to the government if for some reason the government decided to terminate the contract.

While the thrust of this case study is on these three events which will be discussed in more detail later, the program has remained very active and challenging since the events occurred at the end of 1990. For instance:

- The delivery schedules for Lot I and Lot II were once again revised in the summer of 1991 at the same time the Lot III contract was awarded. However, the Air Force determined almost immediately that the new delivery schedule was unachievable and started working to modify the contract again.

As of April 1993, no formal contractual agreement had been reached as to a new schedule or the consideration which should be exchanged.

- The EAC for progress payments has continued to rise. The contract was modified in the summer of 1992 to separate the ceilings and thus, separate loss ratio factors, after it was clear that all three efforts would overrun their respective ceilings.³¹

- Congress's interest in the program has intensified and it has held numerous hearings on the C-17.³² Hearings were still being held in the spring of 1993 discussing the allegations contained in the January 1993 DoD IG report.

- Congress has reduced the President's Budgets for the number of aircraft in FY90, FY91, and FY92 and has included restrictive language in the FY91, FY92, and FY93 Authorization Acts concerning the C-17 program.

- The DoD IG has issued a number of audits critical of the program including three reports specifically addressing the actions taken in the fall of 1990 discussed above. The most recent one, which covers all three events discussed in this paper, was published in January 1993.

- There were a number of technical problems on the program including extensive fuel leaks which delayed flight testing for a short period of time and a wing failure during static testing.

- The Air Force conducted a formal Anti-Deficiency Act violation investigation into the issues raised by the DoD IG. In addition, the Air Force conducted its own investigations as to whether or not disciplinary actions should be taken against a number of Air Force officials as recommended by the DoD IG in its January 1993 report. The investigations were not complete at the time this paper was written.

- On the positive side, T-1 flew successfully on September 15, 1991 and subsequently, DAC has delivered the first five production aircraft.

EVENT BASED CLAUSE

The C-17 was one of the first Air Force programs to incorporate an event-based contracting clause when one was added to the contract in November 1988.³³ As mentioned earlier, this clause was designed to motivate DAC to provide the proper management attention to maintain the program schedule. This clause, named "Prerequisite to Outyear Production Award," preceded any formal policy in event-based contracting and dealt specifically with events to trigger production options.³⁴ The clause included the following aspects:

- Committed the government to award annual long lead for the production buys before 31 January of each year.
- Committed DAC to the projected aircraft delivery schedule as part of the long lead award.
- Established milestones and their respective projected completion dates for the FY89 through FY92 production buys.
- Required the government to exercise the corresponding fiscal year production option within 30 days of completion of the milestone.

The program's acquisition plan in 1988 called for the FY90 (Lot III) LRIP effort to be on a new contract, and that the FY91 (Lot IV), FY92 (Lot V), and FY93 (Lot VI) LRIP efforts would be not-to-exceed priced options on the new contract.³⁵ Having this type of production options would allow the government to exercise the options within 30 days after the completion of the specified event. Therefore, the government did not envision any problems meeting its responsibilities under the clause. However, the cumulative effects of a number of unforeseen problems eventually led the contractor to fail to meet the intent of the clause and the government to fail to meet the technical requirements of the clause. By production lot, these problems were:

- **Lot II:** The milestone to trigger Lot II was the Mission Computer Critical Design Review (CDR). This event was delayed and the government did not award the Lot II production contract until six months after it was scheduled. Therefore, DAC had to "carry" the long lead effort for the six month period according to the clause. In addition, the DoD IG audited the

acceptance process after receiving a Hotline allegation that the production option was inappropriately exercised because, in the complainant's opinion, the CDR had not been completed.³⁶ As a result of this investigation, the government decided that for the future triggering events there should be a written agreement between the government and DAC as to what constitutes successful completion of the event.

- Lot III: The milestone designated to trigger Lot III was the time T-1 moved to the ramp from the final assembly building and the Procurement Contracting Officer (PCO) determined that remaining work could be completed without significant disruption to planned ground and flight test efforts.³⁷ This milestone became known by the euphemism "T-1 Assembly Complete." In January 1989, according to the clause, the government initiated the long lead effort for the FY90 (Lot III) buy of six aircraft. In October 1989, the number of Lot III aircraft was reduced from six to four because of Congressional funding cuts.³⁸

In late spring 1990, because of the DoD IG audit on the Mission Computer CDR milestone for Lot II, the SPO, DPRO, and DAC developed and signed a Memorandum of Understanding (MOU) which discussed what would constitute completion of the "T-1 Assembly Complete" milestone.³⁹ The MOU established a target condition which the T-1 aircraft was to meet; however, the MOU also allowed documented deviations from the target condition. In addition, the final decision whether or not to approve the milestone completion was the PCO's in the SPO and not the DPRO's.

In September 1990, the contract was modified and made the "T-1 Assembly Complete" milestone a separate line item and billing event.⁴⁰ Making the milestone a billing event substantially improved DAC's cash flow and reduced the program risk. First, it would improve DAC's cash flow since DAC would now receive a payment for completion of the milestone approximately six months prior to when DAC would have otherwise received it. Second, it shifted a great deal of risk from DAC to the government upon acceptance of the event because the government would liquidate the progress payments on the line item.

Specifically, in late December 1990 when the SPO accepted "T-1 Assembly Complete," the government paid DAC about \$16 million and assumed roughly \$1.65 billion in risk for the yet-to-be-completed aircraft.⁴¹ This shift of risk would have been very important if the government had decided to terminate the contract subsequent to accepting "T-1 Assembly Complete" because DAC would not have been liable for the \$1.65 billion of progress payments.

The DoD IG again audited the approval/acceptance process the SPO went through for this milestone event. In the IG's opinion, the government inappropriately established, priced, and accepted the "T-1 Assembly Complete" milestone.⁴² The IG also concluded that the SPO rushed the acceptance of "T-1 Assembly Complete" to improve DAC's cash flow before the end of the year and to falsely give the appearance of progress on the program. The IG cited that there was no reason for the government to accept "T-1 Assembly Complete" because it could not award the Lot III contract within the prescribed 30 days.⁴³ In fact, the government did not award the Lot III contract until July 1991--seven months after the event.⁴⁴

OSD started a review of the program in January 1991 and no additional funding was added to the Lot III long lead effort until OSD approved additional funds in March 1991.⁴⁵ The combined impact of all the various delays meant DAC carried the long lead effort without any additional funding for a total of 27 months--15 months beyond the original 12-month period of performance.

- Lot IV: In January 1990 the government initiated the long lead effort for the FY91, Lot IV, production buy for six aircraft.⁴⁶ However, in the fall of 1990 Congress again reduced the President's requested number of aircraft. This time though, the SPO had to eliminate the entire FY91 buy.⁴⁷ However, the government rolled forward the long lead effort for the eliminated FY91 buy into the FY92 production buy long lead effort and added additional funds to it in April 1991--only four months beyond the original 12-month period of performance.⁴⁸

Obviously the "Prerequisite to Outyear Production Award" clause did little to keep the program on schedule. DAC was unable to maintain the delivery schedule even though it was exposed to the additional financial risk of "carrying" the three long lead efforts--Lot II, Lot III, and Lot IV--on its own for a cumulative total of 25 months. Nor could the government follow the clause when the FY91 buy was eliminated. As a result, in the spring of 1991 as part of the overall negotiations for Lot III and the revision of the delivery schedule in Lot I and Lot II, the clause was deleted from the old contract and was not included in the new Lot III contract.⁴⁹

INCLUDING DEVELOPMENT AND PRODUCTION EFFORTS ON THE SAME CONTRACT

From the beginning of the C-17 program, the government planned to have FSED and the first production aircraft on the same contract.⁵⁰ This concept was formalized in the 1985 restructure when the first four production aircraft (all of Lot I and part of Lot II) were designated to be used in the FSED flight test program.⁵¹ These four aircraft would then be refurbished to the final production configuration by an option on the same contract. In addition, the first two production lots were priced options with the same contractual structure as the FSED portion. That is, all three were FPI CLINs with the same ceiling, 130%, share ratio, 80/20, and flexible progress payment rate.⁵² This approach also made sense because of the lack of concurrency between FSED and the production portion of the contract.

However, program concurrency dramatically changed when the contract was modified in 1988, revising the T-1 delivery schedule and reducing the 34-month gap down to a 2-month gap between T-1 and P-1 delivery.⁵³ What had been clear cut in an accounting sense became slightly fuzzy as more production aircraft were being worked on at the same time the development aircraft were being built.

In March 1989, the Air Force recognized it had to deal with the increased concurrency after receiving the FY90 Lot III production proposal.

The issue of causal/beneficial relationship between cost incurred and aircraft that benefitted from the expenditures needed to be resolved. DAC's policy at the time was to charge 100% of engineering to FSED until Functional Configuration Audit (FCA)/Physical Configuration Audit (PCA).⁵⁴ In other words, upon completion of FCA/PCA, the aircraft's design is approved and the remaining production aircraft are produced in that configuration except for formally controlled changes. Normally, the first production aircraft is the FCA/PCA aircraft, but since the first four production aircraft were to be used in the flight test program, the FCA/PCA aircraft for the C-17 program was scheduled to be aircraft P-5. At the time, P-5 was scheduled for delivery in August 1991.⁵⁵ Because of the increased program concurrency, FSED, Lot I, Lot II, and Lot III aircraft were all in production at the same time--well before FCA/PCA. This meant a percentage of the engineering effort would be sustaining and thus, more appropriately chargeable to the production efforts instead of the development effort. Therefore, DAC could change its accounting methods to more accurately reflect the work being done. Generally, nonrecurring engineering effort is associated with development work while recurring engineering effort is associated with production effort. Sustaining engineering is normally a subset of recurring engineering and deals mainly with system engineering to maintain the production line.

This concept of shifting engineering charges from development to production became very important in July 1990 when the government exhausted its FY90 RDT&E funds because DAC's RDT&E expenditure rate was faster than anticipated. To complicate matters further, the following month the ACO at the DPRO, the organization responsible for the overall contract administration of the program, stopped making progress payments on the remaining parts of the contract--Lot I and Lot II LRIP efforts--until DAC provided a supportable EAC.⁵⁶

In July 1990, after the FY90 RDT&E appropriations were exhausted, the SPO reviewed the contract to ensure DAC was being paid everything it was due. During this effort, the SPO suggested to DAC that it review its accounting

practices for sustaining engineering since the SPO believed the transition point from nonrecurring to sustaining was happening earlier than DAC was accounting for in its current practices.⁵⁷

The SPO based its suggestion on SC/AFLC Pamphlet 800-15, "Contractor Cost Data Reporting," which allows the use of "90 percent engineering drawing release date" when no other reasonable transition point can be used.⁵⁸ Therefore, if DAC met the "90 percent" condition, it could transition to sustaining engineering earlier than previously anticipated. Thus, some charges which were currently being applied against the FSED effort could be charged to the production efforts and consequently be paid for out of the fully funded procurement accounts. More importantly, because the development and production efforts were on the same contract, previously paid FSED charges could be "journalled" to production accounts. This bookkeeping exercise, if approved, would result in the FSED accounts being credited and the production accounts being debited by the same amount. Thus, the RDT&E shortfall which started in July would be alleviated and payments could resume after the EAC issue was resolved.

At the same time the journaling was being discussed with DAC, the DoD became aware of MDC's overall poor financial condition.⁵⁹ DoD was very concerned with this information because the country had just entered into Desert Shield and MDC was the top DoD contractor. To better understand MDC's financial situation, the Air Force, supported by OSD, initiated in early September 1990 a joint Cost Performance Review Team to look into MDC's overall financial status.⁶⁰ Specifically, the team was tasked to look at:

- The cost performance and validity of the EAC and if DAC's management was using the data.
- The financial and cash flow position of MDC.
- The legal issues associated with the program.⁶¹

Also in September 1990, DAC formally questioned why progress payments had been stopped and indicated that the program was going through a "financial

crisis" because of the lack of payments.⁶² DAC based its reasoning why progress payments should be resumed on the following arguments:

- Since the contract had a single ceiling, overrun costs should be allocated and borne proportionately across the CLIN structure.

- Since the first four production aircraft were to be used in the test program, the mixing of work justified allocation of the overruns over the entire contract.

- The government would be in violation of the Anti-Deficiency Act, 31 USC 1341, if the government continued to insist that they continue working on FSED effort without paying them. 31 USC 1341 states that the government cannot make a contractor expend funds exceeding the amount available.⁶³

Douglas further indicated that it was reserving the right to stop work or slow down its efforts on the program if the government did not resume payments. DAC reasoned that based on the above rationale, the government could use procurement appropriations to pay for development overruns and that the ACO was improperly suspending progress payments on the production efforts. In its letter, DAC also indicated that it was "working hard on the SPO's request that we search out incurred FSED costs which properly may be reallocated by mutual agreement and journaled to the initial production CLINs."⁶⁴

Upon government legal review, the Air Force determined that DAC was incorrectly interpreting the contract clauses pertaining to the issues and that DAC's reasoning was faulty.⁶⁵ The Segregation of Costs clause clearly required costs to be segregated and that DAC's invoices for the types of work would be submitted separately. In addition, the LOGO clause stated that only RDT&E appropriations would be used for FSED tasks. Therefore, interpreting the clauses the way DAC did would put the contract in violation of the specific purpose statute, 31 USC 1301, which says appropriations can only be used for what they were appropriated for, and also 31 USC 1352, which prohibits transferring funds between appropriations unless specifically authorized. DAC's other allegation, that the government was in violation of

the Anti-Deficiency Act, 31 USC 1341, was also determined to be an incorrect interpretation since DAC had agreed to the provisions of the LOGO clause during negotiations and had not provided the government the necessary notification required by the clause that additional RDT&E funding would be needed.

The government legal review also determined that as long as the Defense Contract Audit Agency (DCAA) or DPRO did not object, there was no reason DAC could not revise its progress payment requests if it found past charges to FSED that could be more appropriately charged to production.⁶⁶ Based on this assessment, DAC kept reviewing its accounting practices for sustaining engineering charges that could be journaled. By the end of September 1990, DAC briefed the SPO and DCAA that it was planning to journal a substantial amount of charges and that it was going to use the 90% initial release date as discussed in AFSC Pamphlet 800-15 to support its actions. DAC followed this up in writing in October 1990.⁶⁷

In the meantime, significant actions were occurring. Senior Air Force acquisition officials met with the DPRO commander and his staff to encourage resuming progress payments based on MDC's financial situation.⁶⁸ As a result, a partial progress payment was made on 1 October 1990 for the production effort on the 2108 contract without a revised EAC. If this payment had been delayed slightly, the revised EAC would have been available and DAC would not have been paid the full amount it received. Even though the majority of the overrun was in the development effort, because of the single ceiling and the application of a single loss ratio factor over all the three efforts, the payment on the production effort would have been reduced.

In addition, the Cost Performance Review Team had completed much of their review by early October and presented interim briefings to senior OSD and Air Force officials. At these meetings the journaling concept was discussed as a possible way of providing MDC legitimate funds.⁶⁹ From notes provided to Congress of one of these meetings chaired by USD(A), it is clear that while USD(A) wanted people to be aggressive in paying MDC everything it

had earned, USD(A) wanted everything done legitimately.⁷⁰ The Cost Performance Review Team also briefed their findings to a combined meeting of senior OSD, Air Force, and McDonnell Douglas leadership, including Mr. John McDonnell, the Chief Executive Officer. After the 1 October 1990 progress payment and a 2 October 1990 Cost Performance Review team briefing, MDC decided to continue working on the program rather than slow down or stop work as it had threatened in its September letter.⁷¹

In the middle of October, DAC formally notified the government of its planned journaling actions.⁷² The government took a number of actions to review the pending change:

- The SPO reviewed and verified DAC's assertion that it had met the 90% release point for engineering drawings in November 1988. The SPO then notified DCAA that this was an accurate date.⁷³

- The SPO notified the DPRO and DCAA that DAC's proposed change was consistent with AFSC Pamphlet 800-15 and that it did not "interpose any objection" to DAC using this definition for the "amendment of payments."⁷⁴ The SPO then attempted to ensure that the journaling was correct when it told them in the same letter that, "any such amended invoice would have to withstand the normal close scrutiny of the DPRO and DCAA."⁷⁵

- DCIA completed its audit of the proposed journaling and reported that it took no exception to DAC's methodology nor the amount being reallocated based on the SPO's technical review of when DAC met the 90% release requirement.⁷⁶ DCAA also indicated that DAC was making a retroactive cost accounting practice change for those charges from December 1988 through September 1990 and therefore was in technical noncompliance with Cost Accounting Standards, but since the change did not affect the ultimate price of the contract, it was acceptable for the Lot I and Lot II efforts.⁷⁷ [underlining added for emphasis] However, DCAA acknowledged that the cost being transferred to the Lot III effort would impact other contract costs but action on this aspect of the situation was delayed until a future audit.⁷⁸

Based on the SPO's and DCAA's information, the ACO approved the November 1990

progress payment which included the journaled sustaining engineering work. A total of \$171.7 million was journaled from FSED to the production lots.⁷⁹ Therefore, the FSED account had an additional \$171.7 million with which to make payments. However, the 1 November 1990 progress payment also included an EAC above the ceiling price of the contract. Therefore, the ACO applied the loss ratio factor in his calculations and DAC only received approximately \$59 million of the \$387 million requested.⁸⁰ Thus, any immediate benefit the journaling action may have had on DAC's cash flow was negated by the application of the loss ratio factor to the progress payment. [see note]

Activity concerning the journaling continued after the initial approval. Over the next nine months, the DPRO, DCAA, and DAC worked to come to an agreement on how DAC was allocating the sustaining engineering costs across work-in-process. As the discussions wore on, the DPRO did its own technical analysis of the work being performed to determine for itself which type of engineering it was--recurring or non-recurring--to support its position. In addition, the DoD IG started providing early indications in January 1991 to the Air Force and OSD that it was finding problems with the 1 October 1990 progress payment as well as the retroactive journaling.

In November 1991, DCAA notified the DPRO it was reversing its October 1990 approval of DAC's allocation method.⁸¹ Based on DCAA's reversal and the DPRO's own interim engineering analysis of the journaled work, the ACO adjusted the November 1991 progress payment by reversing approximately \$142 million of the \$172 million originally journaled in November 1990.⁸² In February 1992, the DoD IG published its Audit Report, "Audit of Contractor Accounting Practice Changes for C-17 Engineering Costs," which alleged that the government had misinterpreted AFSCP 800-15 and allowed DAC to

Note. The loss ratio factor reduces actual payments to the extent they are expected to exceed the contract ceiling. For example, the C-17 FPI contract had a ceiling price of \$6.65 billion and the EAC increased to \$7.1 billion (\$450 million loss). The loss ratio factor was simply \$6.65B divided by \$7.1B, or 93.7%. This figure was then applied to the total costs eligible for progress payments which gave the recognized costs for progress payments ($93.7\% \times \$4.8B = \$4.5B$). The progress payment rate is then applied to the cumulative recognized costs. At the time, DAC's flexible progress payment rate was 99%, therefore it's $99\% \times \$4.5B = \$4.45B$. If the amount previously paid to DAC had exceeded \$4.45B then DAC would have owed the government the difference. Since the progress payments had not exceeded \$4.45, DAC was paid the difference. In this case that amounted to about \$59 million.

inappropriately redefine the transition point from nonrecurring to recurring engineering. Also progress payments were approved based on retroactive cost accounting changes which were prohibited by the Cost Accounting Standards.⁸³ The report further indicated that as a result of these actions, the government prematurely paid DAC \$148 million because of the journaling action. In addition the IG believed that possible violations of public law 31 USC 1301, which says appropriations can only be used for what they were appropriated, could have occurred. Finally, the IG recommended the USD(A) and DCAA Director take a number of specific actions to correct the problems.

The IG audit report generated much activity within the Air Force. Besides taking recommended actions, senior OSD officials had many additional questions regarding its content. In addition, Congressional members and their staffs became more interested in the subject. As a result of many concerns, the Air Force initiated a formal investigation into the potential Anti-Deficiency Violation in August 1992.⁸⁴

LESSONS LEARNED

EVENT-BASED CLAUSE

The current policy on event-based contracting focuses on milestones that are major decision points separating the phases of DoD acquisition programs. This was not the case during the planning and implementation of the event-based clause on the C-17 program. This fact does not invalidate the lessons from the C-17. Specifically, current policy is found in DoD Directive 5000.1, Defense Acquisition, and DoD Instruction 5000.2, Defense Acquisition Management Policies. DoDD 5000.1 states, "Acquisition strategies shall be event driven. . . ."⁸⁵ DoDI 5000.2 further states:

- * (1) The objective of event driven acquisition strategy and event based contracting are to:
 - (a) Highlight key developmental events,
 - (b) Avoid premature commitment to programs,
 - (c) Avoid forcing program decisions solely because of potential loss of priced production options that may expire on a certain date, and
 - (d) Identify contractor responsibility for the cost

of program delays caused by events within the contractor's control.

(2) Event driven acquisition strategy explicitly links program decisions to demonstrated accomplishments in development, testing, and initial production.

(3) Event based contracting supports an event driven acquisition strategy by imposing the linkages between demonstrated performance and corresponding program phase and production decisions. The events set forth in contracts must support the appropriate exit criteria--an event which the successful accomplishment would direct the contractor is ready to proceed with the program--for the phase or intermediate development events established for the acquisition strategy."

While this policy was written after the C-17 clause, there are a number of lessons from the C-17 that would be beneficial to keep in mind.

1. It is essential to have an agreement with all concerned parties as to exactly what constitutes successful completion of an event. This agreement should be able to withstand any scrutiny that may occur. The C-17's first event, the Mission Computer CDR, did not have any agreement and was criticized by the DoD IG. Its second event, "T-1 Assembly Complete," did have an MOU specifying what constituted successful completion. However, while the MOU may have been sufficient for a milestone event, it was not adequate for a billing event.

2. The milestone event should not also be a billing event unless the event is a standard, routine action. "T-1 Assembly Complete" was not a routine action nor was there any contractual reason to rush the acceptance in order to award Lot III, because it was still being negotiated.

3. The acceptance procedures for a milestone event should fall within the normally accepted practices. If acceptance of the event is normally a contract administration function, it should be accepted by that organization. Using "T-1 Assembly Complete" as the example, the PCO signed the acceptance certification and the DPRO was only minimally involved in the process. Again, the DoD IG was critical of this aspect.

4. There should not be a mix of calendar driven events and completion events tied to each other. The C-17 event-based clause committed the government to long lead actions every January. However, it tied the actual LRIP awards to completion events such as "T-1 Assembly Complete." Thus, Lot

II was on long lead for 18 months and Lot III was on long lead for 30 months-- 6 and 18 months longer than originally planned respectively.

The problems which led to the event-based clause being deleted from the contract were the same problems that raised Congressional interest in the program--delivery delays and cost growth. To remedy these problems, Congress has instituted its own "event-based funding" on the C-17 program through the last three Authorization Acts. For instance:

- The FY91 Authorization Act included language restricting use of FY91 procurement funds until a production aircraft had completed its first flight.⁸⁷

- The FY92 Authorization Act included language restricting the use of both FY92 and FY93 procurement funds until various events and reports were completed and reported to Congress.⁸⁸

- The FY93 Authorization Act also included similar language to the FY92 Act restricting the use of FY93 and FY94 procurement funds contingent upon completion of various events and certifications to Congress.⁸⁹

MIXING DEVELOPMENT AND PRODUCTION EFFORTS

There does not appear to be a definitive DoD policy discussing the mixing of development and production efforts on a single contract similar to the event-based policy discussed above. It is assumed, however, that there is a basic understanding that different efforts and funding, must be segregated. The government depends on the contractors' accounting systems to maintain this separation.

Sometimes there are good reasons to have development and production work on the same contract. In the case of the C-17, using one contractual vehicle made good sense because the first four production aircraft were to be used in the flight test program and then refurbished. However, it is also clear that if the efforts had not been together on the C-17, DCAA would not have initially approved the journaling actions which were later reversed. The government initiated the change, approved the change, and later reversed the change based on the three efforts (development, Lot I, and Lot II) being on

one contractual document. By reversing the journaling, the government could have unknowingly caused an Anti-Deficiency Act violation. In addition, if the efforts had not been together, there would not have been a possible Anti-Deficiency Act violation on the 1 October 1990 partial progress payment because there would have been separate EAC's.

The Air Force looked at the journaling change as a way to properly pay DAC for work it had accomplished. However, because of the increase in the EAC and the corresponding application of the loss ratio factor at the same time the journaling occurred, the journaled funds did not have an immediate impact of the program. As a matter of fact, the funds were not used on the program until the end of the third quarter of FY91. The Air Force actually requested a reprogramming action early in FY91 to convert production funds into RDT&E funds. If this request had been on a priority basis rather than a routine basis, it may have been approved and funds available to pay DAC even without the journaling.

The key lesson one can draw from this example is to ensure that any time different types of efforts are on the same contract, all changes which impact funding and/or cash flow should be completely reviewed prior to approval. Since the journaling action had no immediate impact on DAC's cash flow there was no reason to rush its approval prior to completing an audit. Thus, if the change had been fully audited it might not have been approved and there would not have been a reason to have a formal Anti-Deficiency Act violation investigation.

SUMMARY

The Air Force planned for the C-17 to be a state-of-the-art strategic airlifter. The FPI contract type selected was appropriate for the risk contemplated at the program's initiation. In an effort to properly package the program because the first four production aircraft would initially be used in the flight test program, the Air Force combined the development effort with

the first two LRIP efforts onto one contract. To balance the risk involved, the Air Force also allowed the three efforts to be under a single ceiling.

The rationale for these decisions was sound at the time they were made. However, the contract structure provided the opportunity for the contractor and the government to make the controversial journaling decision and make the questionable progress payment. Part of the DoD IGs concerns have been solved through a contract modification that separated the ceilings of the three efforts. The problems created by the journaling and the subsequent reversal are still being worked at the time of this report. As far as the event-based clause is concerned, the deletion of the clause from the contract has eliminated compliance problems but the problems themselves, i.e., schedule slips and funding changes, have not been corrected.

However, the consequences of these actions have had a profound impact on the program. For instance:

- Congressional scrutiny of the program has increased dramatically over the past few years including more than a half dozen hearings on the program. Partially as a result of these actions, the President's Budget for the program have been repeatedly cut by congressional committees.

- A crisis management mode has existed on the program within DoD driven by the constant investigations and hearings over a prolonged time period. This has reduced the efficiency of the entire program and has strained the working relationships between many government organizations.

In conclusion, it seems prudent to closely consider any action taken to "help" a contractor when it is having financial problems. In hindsight, the financial advantages DAC received from taking these actions were not worth the subsequent problems both the Air Force and DAC have undergone.

END NOTES

1. Smith, Bruce A. "Management Miscues, Delays Snarl C-17 Program." Aviation Week & Space Technology. 12 April 1993: 30.
2. HQ USAF PMD No. R-C 0020 (1). "Program Management Directive for Implementation of the C-X Program." 10 Dec 1979: 1-3.
3. Johnson, Charles L. "Acquisition of the C-17 Aircraft - An Historical Account." ACSC Student Report, 86-1270: 29-30.
4. HQ USAF PMD No. R-C 0020 (1), *ibid.*, 1.
5. Johnson, *ibid.* 13, 28.
6. Business Strategy Panel Minutes, C-X Aircraft Program. 22 Feb 1980.
7. ASD/CC Ltr, Subj: C-X Acquisition Program Request for Proposal (RFP); F33657-80-R-0227. 15 Oct 1980: 1.
8. CINCMAC/CS-CX Staff Summary Sheet, Subj: Contracting for the C-X Program (CSD #24661). 29 Sep 1980: 1.
9. Johnson, *ibid.*, 181.
10. Stork, Joe and Wenger, Martha. "From Rapid Deployment to Massive Deployment." The Gulf War Reader, Edited Micah L. Sifry and Christopher Cerf. Times Books, New York: Random House, 1991: 35.
11. Johnson, *ibid.*, 245-246.
12. Johnson, *ibid.*, 255.
13. USAF Contract F33657-81-C-2108, 23 Jul 1982.
14. SECDEF Memo, Subj: C-17 Full Scale Engineering Development (FSED). 15 Feb 1985: 1-2.
15. Modification P00044, "Contract Restructuring." USAF Contract F33657-81-C-2108. 31 Dec 1985.
16. *ibid.*, 144.
17. *ibid.*, 147.
18. *ibid.*, 26.
19. Smith, *ibid.*, 30.
20. Modification P00108, "FY87 Contract Restructure." USAF Contract F33657-81-C-2108. 28 Jan 1988.
21. Transcript, "The C-17 Aircraft Program" Legislation and National Security Subcommittee, Government Operations Committee. Federal Information Systems Corporation, LEGI-SLATE Report for 102nd Congress. 13 May 1992: 98.

22. Modification P00199, "Pre-Requisite to Outyear Production Awards." Special Provision H-111, "Prerequisite to Outyear Production Award," USAF Contract F33657-81-C-2108. 18 Nov 1988.
23. Modification P00304, "Incorporation of Revised Schedule." USAF Contract F33657-81-C-2108. 25 Sep 1990.
24. Yockey, Donald J. Opening Statement to the Legislation and National Security Subcommittee, Government Operations Committee. 24 Jul 1991: 3.
25. Transcript, HIF 276020, "McDonnell Douglas Corporation's Technical and Financial Difficulties Associated with its Major Weapons Programs." Oversight and Investigations Subcommittee, Energy and Commerce Committee. 3 Oct 1991: 2-3.
26. DAC Ltr C1-GSD-16, Subj: C-17 Progress Payments, Contract No. F33657-81-C-2108. 6 Sep 1990: 1.
27. DCMW-RDAC Ltr, Subj: Progress Payment Estimate-at-Completion (EAC), F33657-81-C-2108. 14 Aug 1990.
28. DoD Inspector General Audit Report, "Government Actions Concerning McDonnell Douglas Corporation Financial Condition During 1990." January 1993: 29.
29. SAF/AQCS Memo, Subj: Did the Air Force plan to "bailout" McDonnell Douglas Corporation? 31 Mar 1992.
30. DoD Inspector General Audit Report No. 92-074, "Contracting Practices for the C-17 Flight Test Aircraft." 10 Apr 1992: i.
31. Modification P00294, "Clarification of Target and Ceiling for FSED, Lot I and Lot II." USAF Contract F33657-81-C-2108. 15 Jul 1992.
32. Hudson, Neff. "Conyers urges suspension of C-17 work." Air Force Times 8 Feb 1993: 18.
33. Transcript, "The C-17 Aircraft Program." *ibid.*, 98.
34. Modification P00199, *ibid.*
35. Acquisition Plan No. YC-88-0001, "Acquisition Plan for C-17A Aircraft System (Program Element 411130F)." USAF Aeronautical Systems Division. 11 Jul 1988: 9.
36. DoD Inspector General Audit Report No. 91-007, "Selected Acquisition Actions on the C-17 Aircraft." 2 Feb 1990: 1.
37. Modification P00199, *ibid.*
38. ASD/YCK Ltr, 2108-89-1398, Subj: F33657-81-C-2108, Lot III Advance Buy, P00210. 5 Oct 1989.
39. USAF Memorandum of Understanding, "Definition of Assembly Complete Milestone for C-17 Aircraft T-1." 12 Jun 1990: 1-2.
40. Modification P00304, *ibid.*, 2.
41. Invoice No. D50632, Payment for "T-1 Assembly Complete." 24 Dec 1990.

42. DoD Inspector General Audit Report No. 92-074, *ibid.*, i.
43. *ibid.*, 9.
44. USAF Contract F33657-89-C-0001, 26 Jul 1991.
45. Modification P00331, "Long Lead for Lot III C-17 Production," USAF Contract F33657-81-C-2108. 18 Mar 1991.
46. Modification P00275, "Long Lead for Lot IV (FY91)." USAF Contract F33657-81-C-2108. 31 Jan 1990.
47. ASD/YCK Ltr, 0601-91-0057, Subj: RFP F33657-89-R-0001, C-17 Program Advance Buy/Long Lead for FY92 Buy. 18 Jan 1991.
48. Modification P00333, "Additional Advance Buy/Long Lead for Lot IV (FY92) Aircraft Buy." USAF Contract F33657-81-C-2108. 15 Apr 1991.
49. Modification P00384, "Restructure of FSED, Lot I and Lot II Schedule," USAF Contract F33657-81-C-2108. 30 Jul 1992.
50. USAF/HQ ASD Business Strategy Panel Minutes, C-X Aircraft Program. 22 Feb 1980: 1-6.
51. HQ ASD/PMF Ltr, Subj: Price Negotiation Memorandum, C-17 Restructure. 21 Nov 1985: 1-2.
52. *ibid.*, 1.
53. Modification P00108, *ibid.*
54. DAC Ltr, C1-DEO-2108-90-1851, Subj: Contract F33657-81-C-2108 Allocation of Sustaining Cost. 11 Oct 1990: 1-4.
55. Modification P00108, *ibid.*
56. DCMDW-RDAC Ltr, *ibid.*
57. DAC Ltr, Subj: Resubmission of Air Force Progress Payment Request #98. 31 Oct 1990.
58. AFSC/AFLC Pamphlet 800-15, Contractor Cost Data Reporting. 5 Nov 1973: 4-5 - 4-6.
59. Yockey, Donald J. Opening Statement to the Legislation and National Security Subcommittee, Government Operations Committee. 24 Jul 1991: 3.
60. SAF/AQCS Memo, *ibid.*
61. *ibid.*
62. DAC Ltr C1-GDS-16, *ibid.*, 1-6.
63. *ibid.*, 1-6.
64. *ibid.*, 1-6.

65. DoD Inspector General Report, "Government Actions Concerning McDonnell Douglas Corporation Financial Condition During 1990." January 1993: 28.
66. *ibid.*, 29.
67. DAC Ltr, C1-DEO-2108-90-1851, *ibid.*, 1-4.
68. Transcript, "The C-17 Aircraft Program." *ibid.*, 57.
69. SAF/AQCS Memo, *ibid.*
70. Conyers, John. Ltr to Secretary of Defense, 1 Jul 1992.
71. DoD Inspector General Report, "Government Actions Concerning McDonnell Douglas Corporation Financial Condition During 1990." Jan 1993: 42.
72. DAC Ltr, C1-DEO-2108-90-1851, *ibid.*
73. HQ ASD/YCK Ltr, 2108-90-1405, Subj: F33657-81-C-2108, 90% Initial Release (IR) Point for Drawings. 25 Oct 1990.
74. HQ ASD/YCK Ltr, 2108-90-1390, Subj: Contract F33657-81-C-2108, Possible Amended Progress Payment Invoice. 25 Oct 1990.
75. *ibid.*
76. DCAA Audit Report No. 4461-91B13980003, "Report on Audit of C-17 Journal Entry to Reallocate Sustaining Engineering." 31 Oct 1990: 2-3.
77. *ibid.*, 3.
78. *ibid.*, 3.
79. DoD Inspector General Audit Report No. 92-046, "Audit of Contractor Accounting Practice Changes for C-17 Engineering Costs." 13 Feb 1992: 14.
80. DAC Request for Progress Payment No. 98, 29 Oct 1990.
81. DCAA Ltr PCD 730.3-20, Subj: Response to 29 September 1992 Request for Audit Guidance on Funding Implications When Reviewing CAS Cost Impact Proposals. 13 Oct 1992.
82. SAF/AQ, "Report on the Impact of the Prospective Application of the Revised Accounting Practice Change on the Use of Appropriated Funds." 2 Apr 1992: 2.
83. DoD Inspector General Audit Report No. 92-046, *ibid.*, i.
84. HQ AFMC/CC Ltr, Subj: Investigation of Potential Anti-Deficiency Violation, C-17 Program-Interim Report. 13 Oct 1992: 1.
85. DoD Directive 5000.1, Defense Acquisition, 23 Feb 1991: 1-4.
86. DoD Instruction 5000.2, Defense Acquisition Management Policies and Procedures. 23 Feb 1991: 5-A-2.

87. National Defense Authorization Act for Fiscal Year 1991. PL 101-510, Section 161, "C-17 Aircraft Program Funding and Limitations for Fiscal Year 1991." 5 Nov 1990: 104 STAT. 1506.
88. National Defense Authorization Act for Fiscal Years 1992 and 1993. PL 102-190, Section 133, "C-17 Airlift Program." 5 Dec 1991: 105 STAT. 1310-1311.
89. National Defense Authorization Act for Fiscal Year 1993. PL 102-484, Section 134, "C-17 Aircraft Program." 23 Oct 1992: 106 STAT. 2335-2337.